Return flow and water conservation in agricultural systems

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Example definitions of Irrigation Return Flow

Examples of *Irrigation return flow* in a sentence

Irrigation return flow (which includes surface and subsurface water that leaves a crop field following irrigation of that field) and agricultural stormwater runoff do not require NPDES permits, as they are exempted from the Clean Water Act.

Irrigation return flow from 3,000 or more acres of land when conveyed to navigable waters from one or more point sources.

Irrigation return flow from 3,000 or more acres of land when conveyed to navigable waters from one or more point sources.However, the state may prescribe waste discharge requirements for any point source discharger regardless of size.

Irrigation return flow (which includes runoff from a crop field due to irrigation of that field) and agricultural stormwater runoff do not require NPDES permits, as exempted by the CWA.

Irrigation return flow is the component of effective precipitation plus applied agricultural irrigation water that exceeds crop ET (crop water demand) and percolates to the groundwater.

Irrigation return flow, part of percolation from the surface, is a consistent source of inflow to the Cawelo groundwater basin regardless of the water year type.

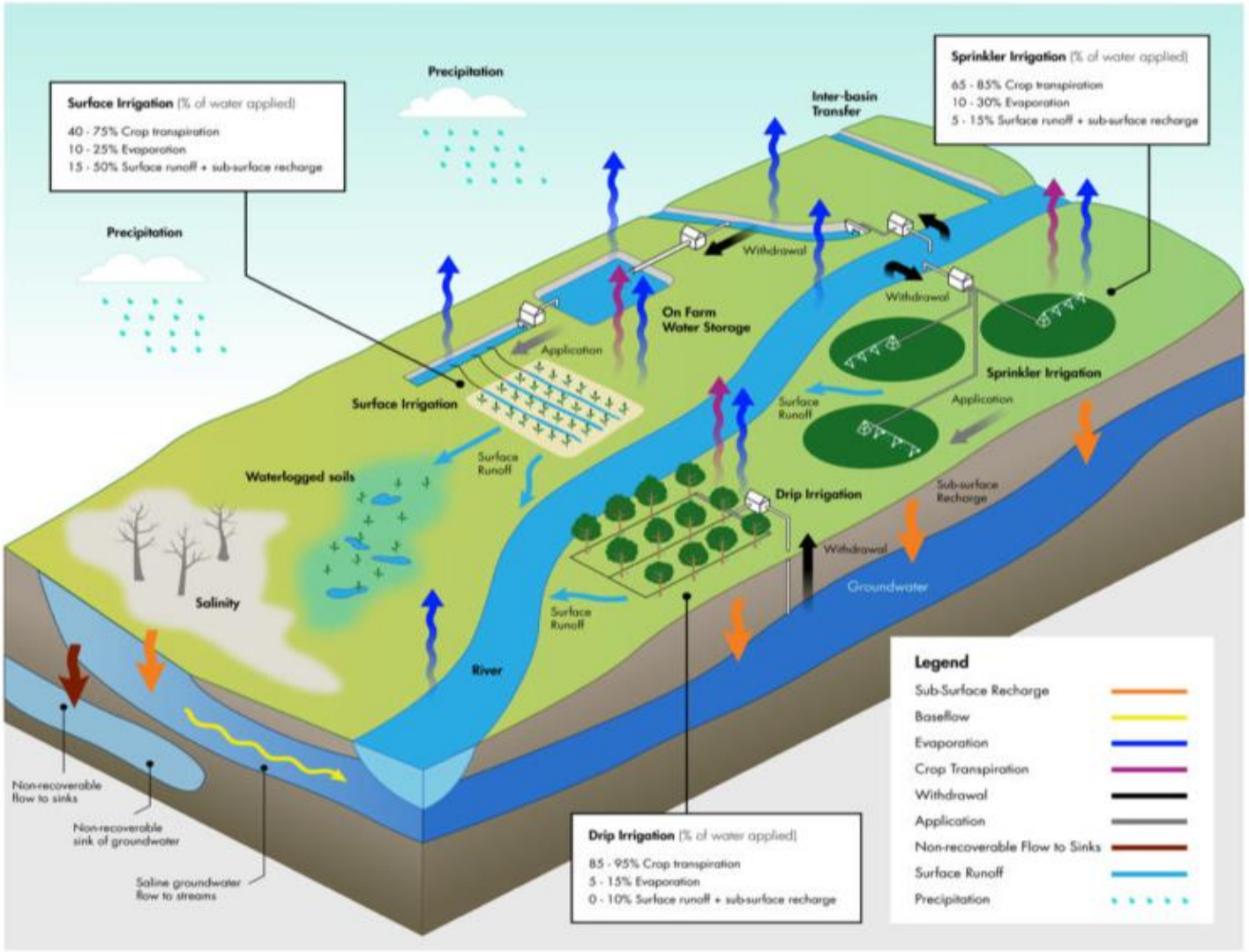
Irrigation return flow from agricultural fields may drain through a defined outlet, but is exempt under the CWA and does not currently require a permit.

Irrigation return flow is any excess irrigation water that infiltrates soil beneath the root zone (Healy, 2010).

Irrigation return flow eventually discharges to Carson Lake, the Stillwater Wildlife Refuge, and/or the Carson Sink.

Irrigation return flow and leaky irrigation ditches can be a significant recharge element in the local ground water balance.

Typical irrigation return flow diagram



Consumptive and non-consumptive use

WAC 173-500-050. Definitions.

“Consumptive use” means use of water whereby there is a diminishment of the water source.

“Nonconsumptive use” is a type of water use where wither there is no diversion from a source body, or where there is no diminishment of the source.

Conservation in the Water Code

"Conservation encouraged" or "water use efficiency encouraged" - 3 times

- RCW 90.46.005
- RCW 90.54.020
- RCW 90.54.180

Other references to reducing wasteful practices, implementing conservation projects

- Ch. 90.03, 90.44, 90.90, 90.94 RCW

Examples of consumptive and non-consumptive water use by various water users

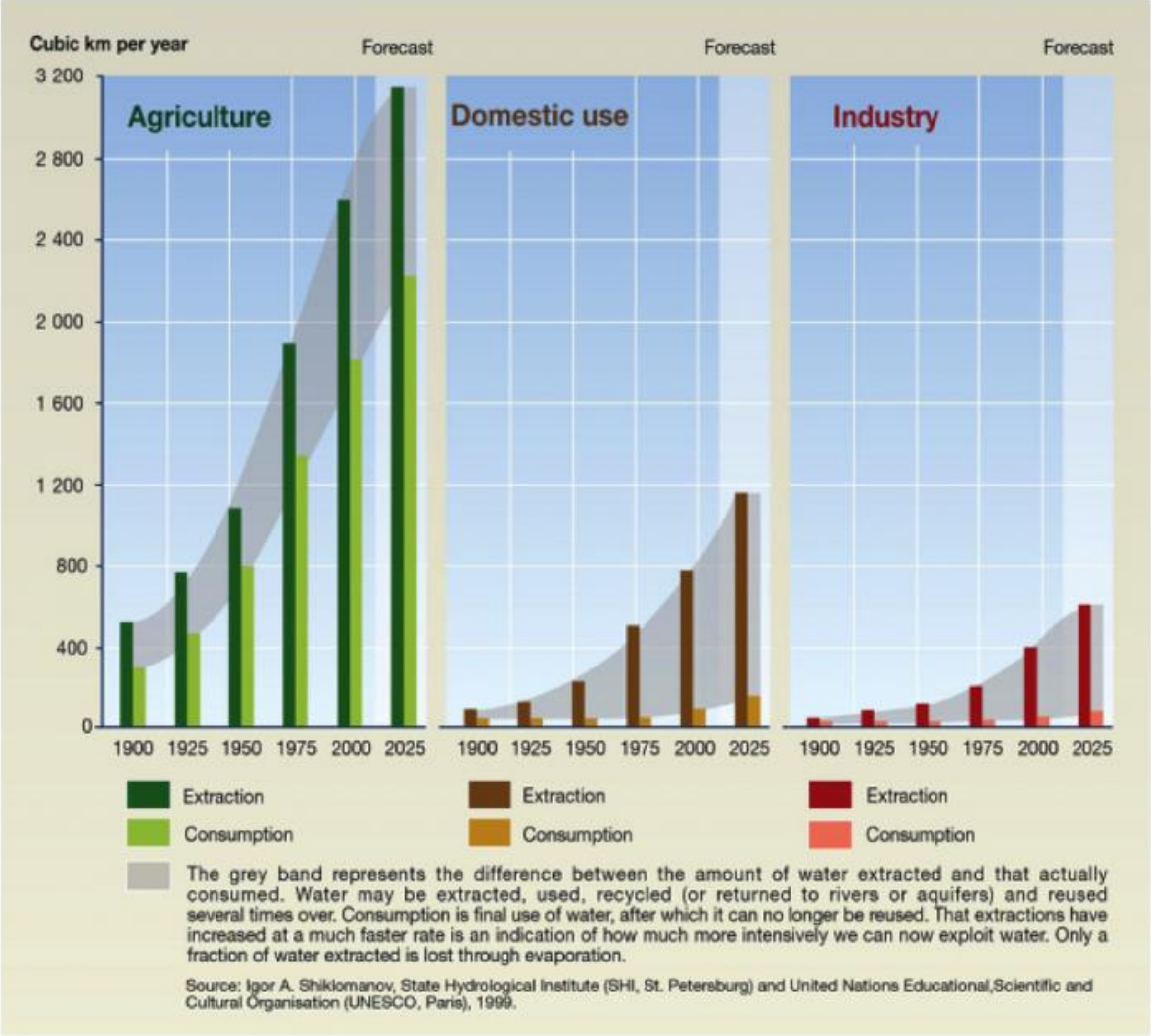


Figure 13. Proportions of water withdrawals used for agriculture, industry, and domestic use from 1900-2000, and projected for 2005. The gap between extracted and consumed water is shown by the gray band in each panel.
Click here to expand for a text description of Figure 13

Source: United Nations Environment Programme Vital Water Graphics

From YRBWEP to Integrated Plan

1979 - Studies Authorized

The Yakima River Basin Water Enhancement Project began after devastating drought in the 1970s when Congress authorized a study to find solutions to the basin's water supply problems.

1984 - YRBWEP Phase I - Fish Passage

Early studies identified fish passage issues. Fish screens and ladders were built at diversion dams to help fish move freely upstream to spawn.

1994 - YRBWEP Phase II - Conservation

The next phase conserved water for agriculture and instream flows; acquire and restore important habitat in the Yakima River watershed.

2009 - YRBWEP Phase III - Integrated Plan

The Integrated Plan is a watershed-scale, balanced approach to sustainable water supply for families, farms, and fish.

Integrated Plan

The Integrated Plan is comprised of seven elements. The map below shows the location of a few example projects from each element.

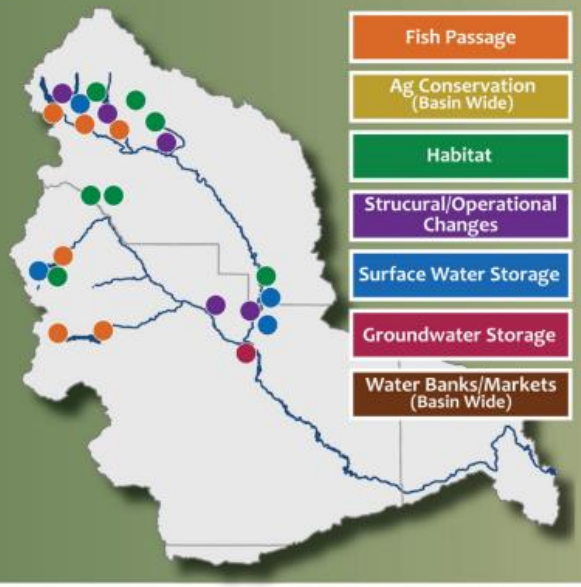
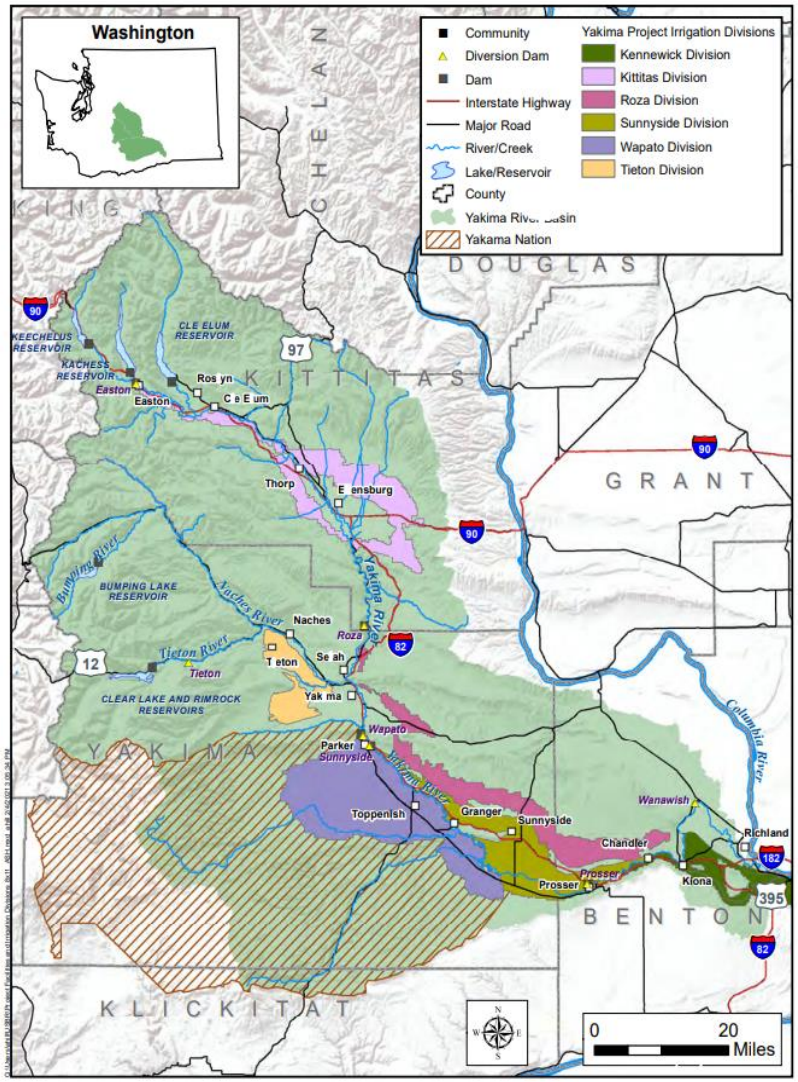
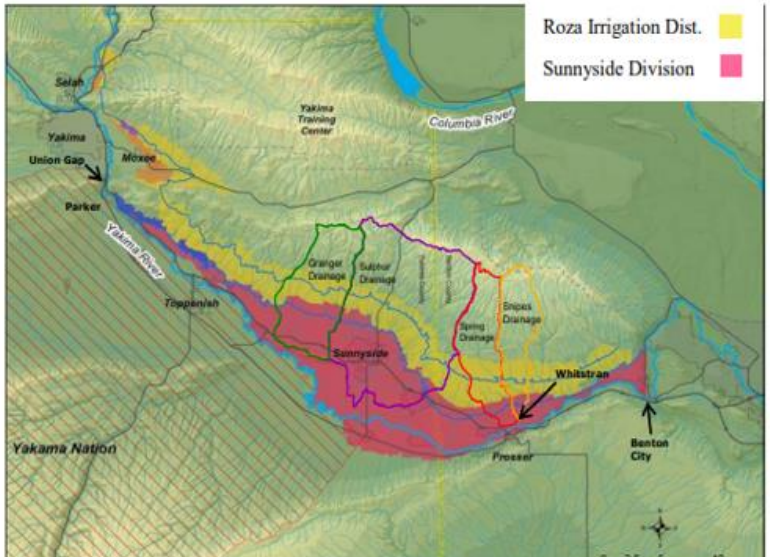


Figure 2 YRBWEP to Integrated Plan

Yakima Basin irrigation districts, drains and waste ways





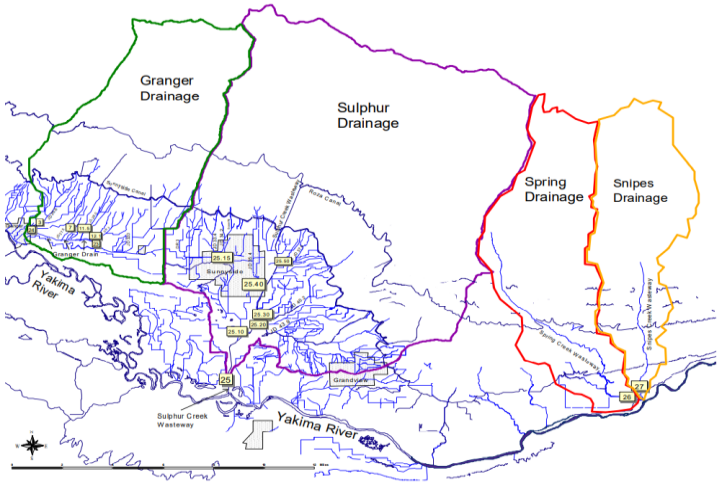
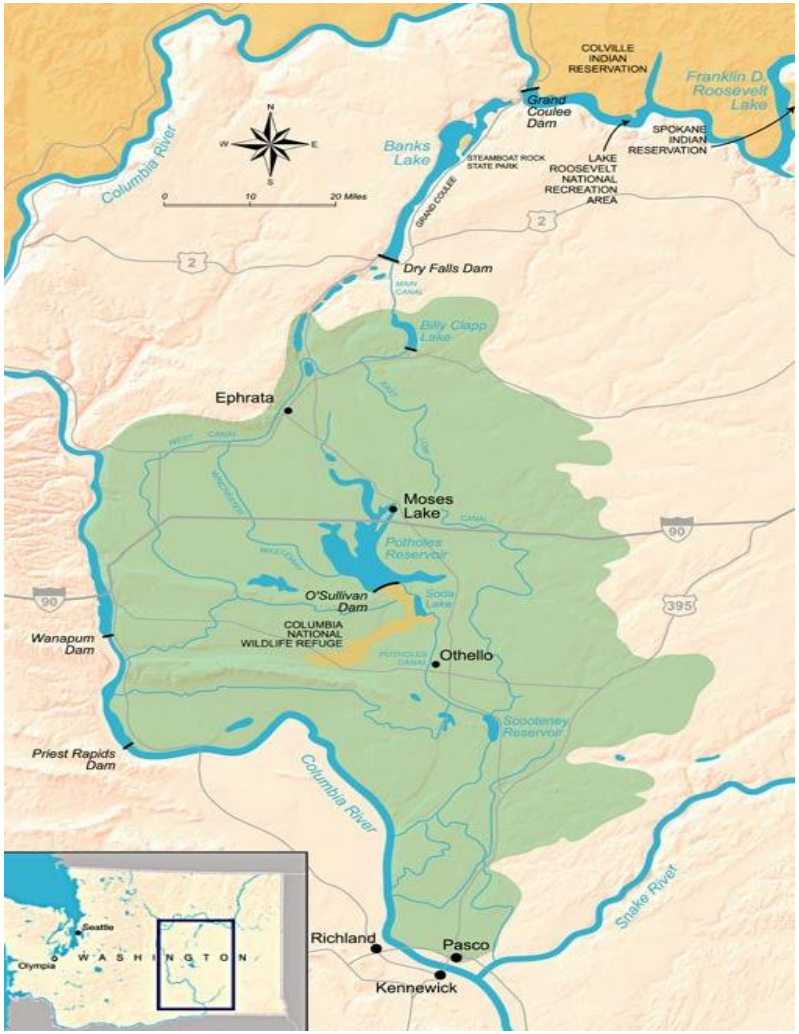
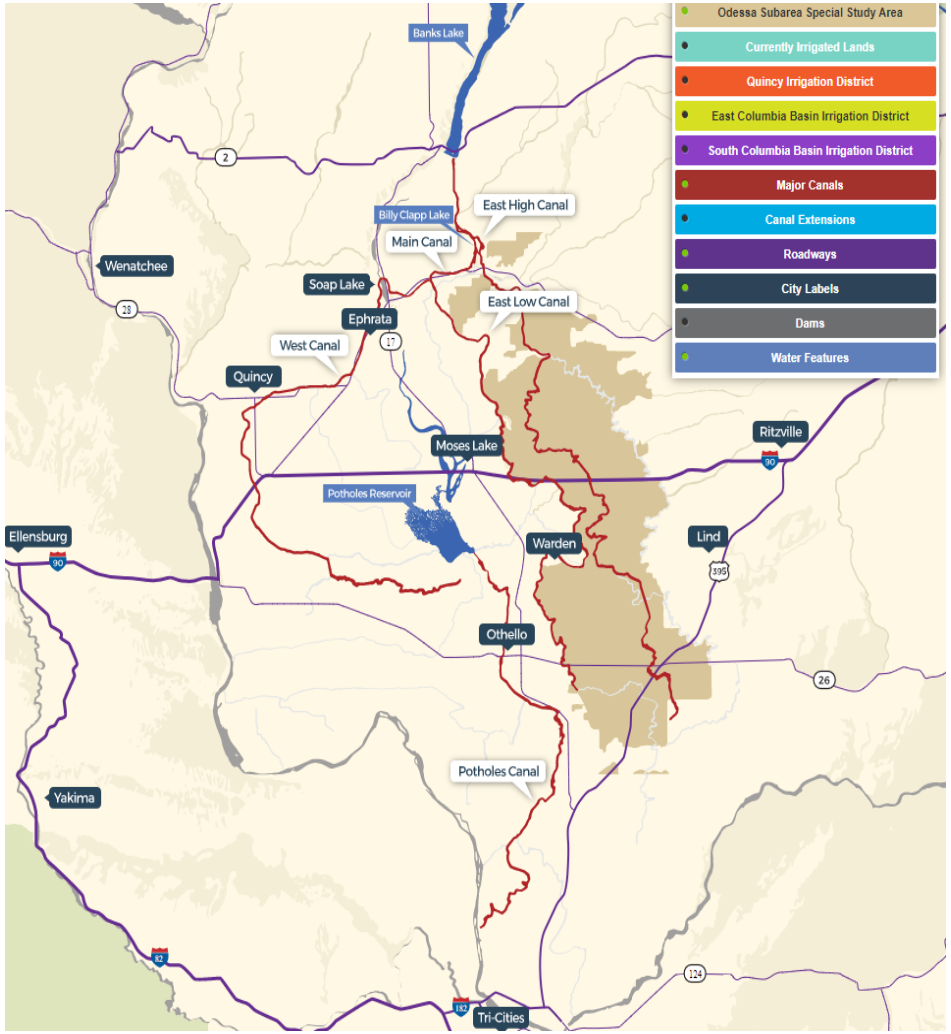


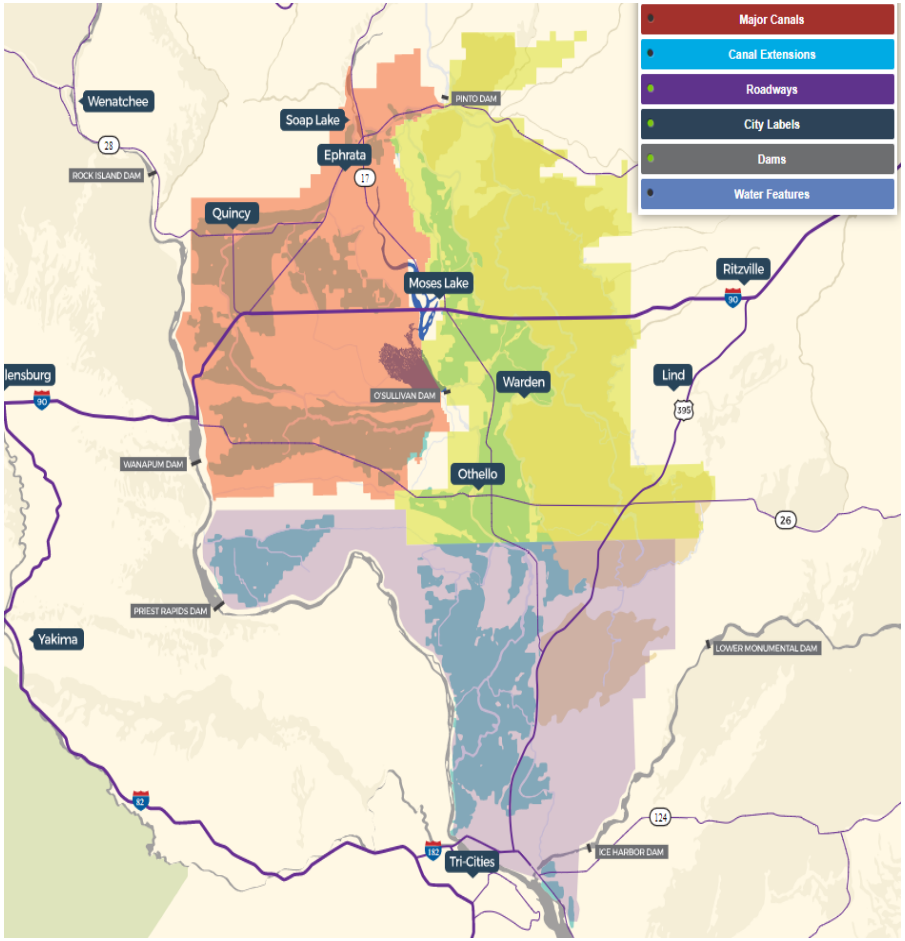
Figure 4. Approximate location of select sampling sites.

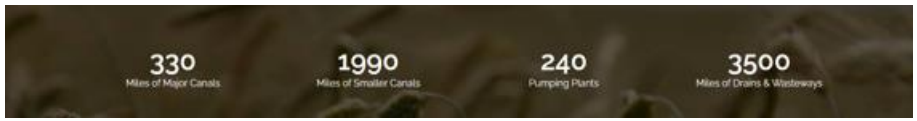
USBR - Columbia Basin Irrigation Project

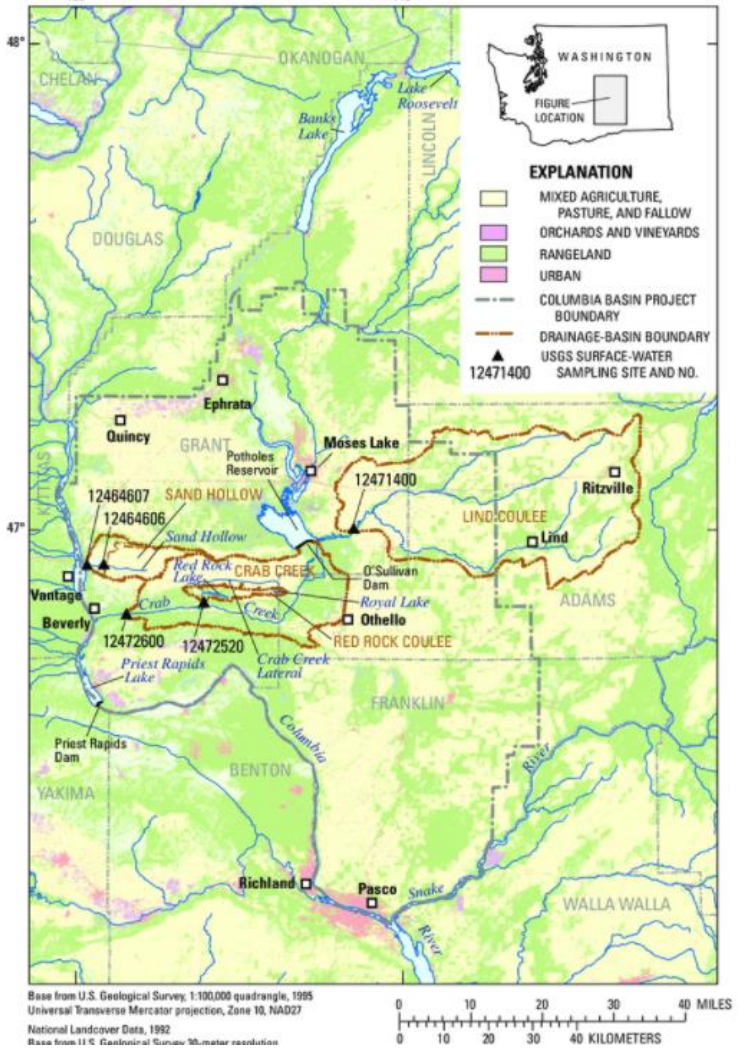




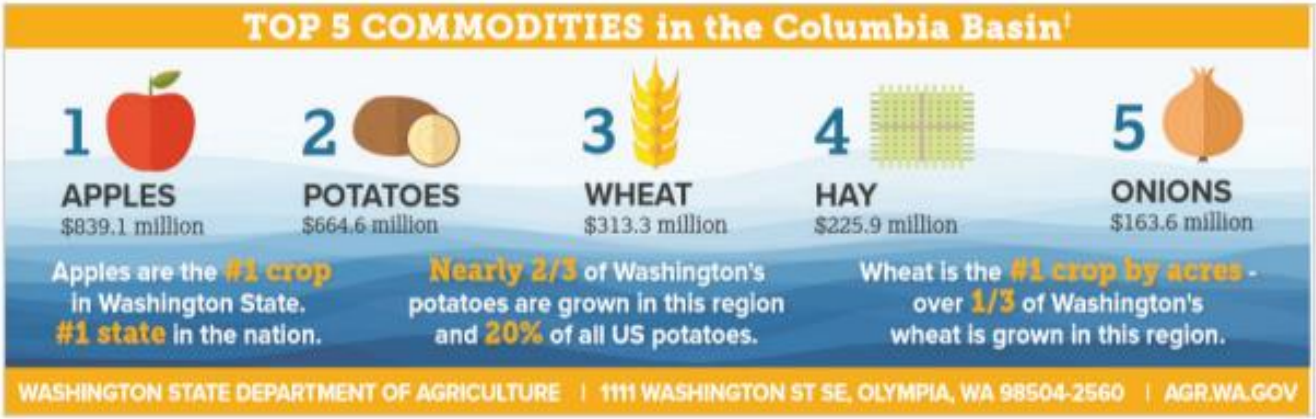
Irrigation Districts and Drainage Basins



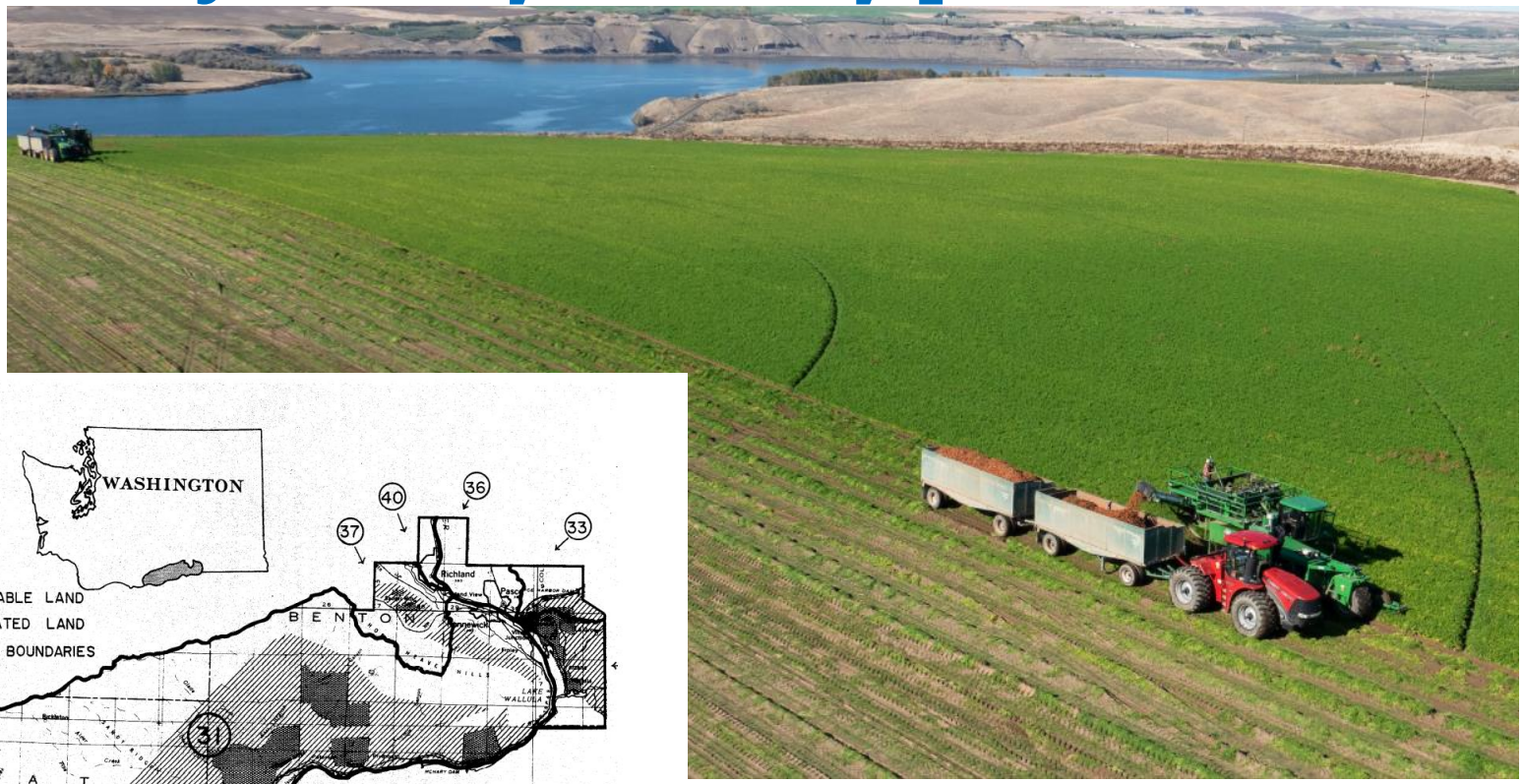




CBP - an Agriculture Powerhouse



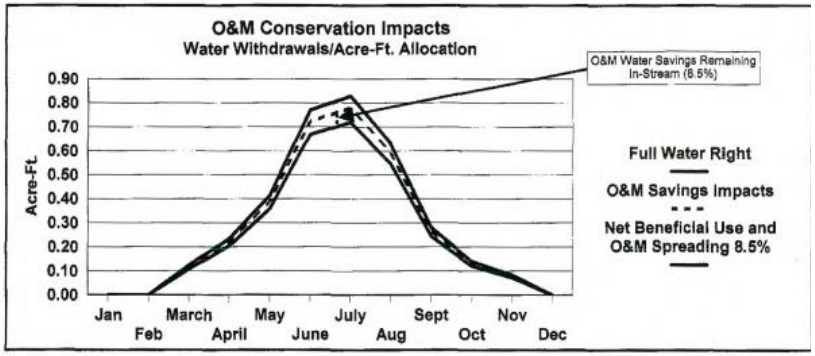
Columbia – Snake River direct pumpers John Day, McNary pools



Irrigation Water Management Savings Analysis

Water Withdrawal Impacts With/Without Conservation O&M and Other Management Measures

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Water Right Full Allocation (3.5 acre-ft./acre)	0.00	0.00	0.12	0.23	0.41	0.77	0.83	0.63	0.26	0.14	0.08	0.00	3.50
Crop & Efficiency Water Withdrawals-With Cons. O&M at 17.5%	0.00	0.00	0.12	0.22	0.39	0.72	0.78	0.59	0.26	0.13	0.08	0.00	3.29
Crop & Efficiency Water Withdrawals-With Cons. O&M at 8.5%	0.00	0.00	0.11	0.20	0.36	0.67	0.72	0.55	0.24	0.12	0.07	0.00	3.04
O&M Savings Used for Spreading	0.000	0.000	0.008	0.016	0.028	0.052	0.056	0.043	0.019	0.010	0.006	0.000	3.041
Potential O&M Cons. Remaining In-River	0.000	0.000	0.009	0.017	0.030	0.055	0.060	0.045	0.020	0.010	0.006	0.000	0.252
Maximum "Risk" Impact (Critical Period "Return Flows")	0.000	0.000	(0.000)	(0.001)	(0.002)	(0.003)	(0.003)	(0.003)	(0.001)	(0.001)	(0.000)	0.000	(0.014) 0.0%



* Risk impact assumes "instantaneous" return flow relationship--not a realistic or accepted assumption.

NOTE: State Conservation Districts and Other Private Sector Consultants Estimate O&M Water Conservation Savings at 17% (reduced water application on field).

Irrigation Water Management Savings (Conservation O&M)

Studies & Field Data Collected	# Fields	% Water Savings
▪ Scientific Irrigation Schedule, Grower Training	255	12.4%
▪ Royal Consulting Case Study – Grant PUD	165	18.1%
▪ Professional Agriculture Water Applied	4,643	17.7%
▪ Washington State University – NEEA (Growers)	15	15.8%
▪ GWMA IWM Participants in Franklin/Grant/Adams Counties (7000 Fields Collected 2000-2005) - Combined Statistics of Fields Analyzed	1,088	16.7%
Average: Weighted Average by # Fields		**17.31%**
*Compiled by the Columbia Basin Ground Water Management Area (2005)		

Source material from:
Columbia-Snake River Irrigators Association – 2012
Benton/Franklin Conservation Districts – 2012
Pacific Groundwater Group - 2012
IRZ Consulting, LLC - 2004

Thank you - Questions?